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September 30, 1998

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

By Messenger

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C., 20554

Re: Petition for Rulemaking -- Fixed Wireless Access (FWA); Petition for Allocation of Radio Spectrum and Licensing Rules in the 3.4-3.7 GHz Band to Allow Carriers to Improve Deployment and Reduce Costs Through the Provision of Fixed Wireless Access

Dear Ms. Salas:

Transmitted herewith, pursuant to Sections 1.401 and 1.419 of the Commission's rules, 47 C.F.R. §§ 1.401 & 1.419, on behalf of Mountain Telecommunications, Inc. and Saddleback Communications Company, are an original and four copies of the above-referenced Petition for Rulemaking.

Should there be any questions regarding this filing, please communicate with the undersigned counsel.

Respectfully submitted,

James A. Casey
Counsel for Mountain
Telecommunications, Inc. and Saddleback
Communications Company

Enclosures

dc-132222

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ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
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Fixed Wireless Access (FWA)	)	
	)	
	)	RM No. _____
Petition for Allocation of Radio Spectrum and Licensing Rules in the 3.4 - 3.7 GHz Band to Allow Carriers to Improve Deployment and Reduce Costs Through the Provision of Fixed Wireless Access	)	

Mountain Telecommunications, Inc.
and
Saddleback Communications Company

PETITION FOR RULEMAKING

September 30, 1998

SUMMARY

In this Petition, Mountain Telecommunications, Inc. ("MTI") and Saddleback Communications Company ("Saddleback) urge the Commission to allocate spectrum in the 3.4 - 3.7 GHz band for Fixed Wireless Access ("FWA") service. The rest of the World appears to be coalescing on the 3.4 - 4.2 GHz bands for FWA applications. Indeed, governments in the Americas, through CITEL, have recommended the 3.4 - 3.7 GHz band for harmonized FWA applications throughout this region, and in Europe CEPT has also adopted this band. Moreover, Canada and Mexico are already embracing this band within their domestic licensing policies.

MTI is licensed as a Local Exchange Carrier by the Arizona Corporation Commission ("ACC") and is actively rolling out its services to residential and business customers within the State of Arizona. Saddleback is a division of the Salt River Pima-Maricopa Indian Community, a federally recognized Indian Tribe, and a provider of local telecommunications services on Community lands, east of Scottsdale, Arizona. MTI provides operations and maintenance services to Saddleback.

MTI has been investigating the various alternatives to economically extend its full quality wireline services to unserved and underserved residential and small business customers within its target communities, despite the relatively low density of the population and the rugged terrain in the region. After a thorough analysis of the potential solutions, MTI has determined that the desired services can only be achieved in a cost effective manner by the use of the latest type of FWA systems now being deployed in global markets outside the United States.

MTI and Saddleback (together, "the Petitioners") desire immediately to bring the benefits of robust communications capabilities made possible by these latest technologies to our customers, and to take advantage of the economies of scale offered by purchasing commercial off-the-shelf solutions. As a short-term fix, MTI has sought experimental

authority to offer service via FWA technology to its customers. MTI believes that the experimental program will facilitate service to its customers and confirm the technical, economic and customer service aspects of FWA under actual field conditions. In order to provide a permanent, widescale solution to a problem that plagues many carriers, individuals and small businesses, however, the Petitioners are filing this petition for rulemaking to allocate spectrum and adopt changes to the Commission's Rules to provide carriers with an appropriate FWA option.

The Petitioners acknowledge that presently the United States, unlike other countries, has allocated this band for exclusive Government use (for radiolocation) on a PRIMARY basis. Nonetheless, based on the preliminary results from potential interference studies currently being conducted by Northern Telecom Inc. ("Nortel") and the Department of Defense/Joint Spectrum Center ("JSC"), and assuming confirmation of these tests via successful field operation under our experimental license, we believe that it will be feasible to define some reasonable technical coordination rules that will enable operators like MTI to deploy FWA systems in such a manner so as not to impact adversely the operations of the U.S. Government in this band. The Petitioners are therefore filing this petition for rulemaking to bring the U.S. Table of Frequency Allocations into alignment with ITU allocations for this band by adding Fixed Service as a PRIMARY Shared User of this band. In addition, this petition includes proposed amendments to the Commission's Rules for the Fixed Microwave Services (47 C.F.R. Part 101) to specify licensing and other procedures for the FWA technology, including an explicit requirement for coordination with the National Telecommunications and Information Administration ("NTIA") and the Department of Defense ("DoD"). Under the proposed rules, FWA would be licensed in a manner similar to other current Part 101 common carrier services, with site-by-site coordination of nodal stations, and blanket licensing of the individual subscriber transceivers associated with the nodal station. Auctions would be used in the few cases where it is necessary to resolve mutually

exclusive applications. In addition, FWA operators would pay appropriate application and annual regulatory fees.

The Petitioners believe that the proposed allocation and rule changes will serve the public interest. Such actions will enable licensed incumbent and competitive local exchange carriers more rapidly to improve the rollout of basic, advanced and future fixed telecommunications services to residential and small business consumers throughout America. In particular, FWA will allow the deployment of robust telecommunications capabilities outside the high-density urban areas. In these less densely populated areas, it typically takes longer and costs more to deploy copper or fiber-based technologies, therefore FWA holds forth the promise of achieving meaningful choice and competition even in these non-urban territories. This petition details the urgency of these matters from the perspective of the Petitioners and the communities that they serve. This petition also demonstrates the wider public interest benefits of FWA, including achieving more affordable Universal Service and providing access to the National Information Infrastructure -- policies explicitly advanced by the Telecommunications Act of 1996.

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
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Fixed Wireless Access (FWA)	)	
	)	
	)	RM No. _____
Petition for Allocation of Radio Spectrum and Licensing Rules in the 3.4 - 3.7 GHz Band to Allow Common Carriers to Improve Deployment and Reduce Costs Through the Provision of Fixed Wireless Access	)	

TO: The Commission

PETITION FOR RULEMAKING

Mountain Telecommunications, Inc. ("MTI") and Saddleback Communications Company ("Saddleback") (together, "the Petitioners"), pursuant to Section 1.401 of the Federal Communications Commission's ("FCC" or the "Commission"), 47 C.F.R. § 1.401, hereby request the immediate initiation of a rulemaking proceeding to allocate radio spectrum in the 3.4 - 3.7 GHz band for use in the provision of fixed wireless access ("FWA") by telecommunications carriers. Radio frequencies in the 3.4 - 3.7 GHz band have the proper combination of propagation characteristics and bandwidth to satisfy the public need for the deployment of FWA solutions as an alternative technology to traditional copper or fiber for residential and small business applications. As detailed herein, the public interest will be greatly enhanced by the allocation of this spectrum for FWA usage. The Petitioners recognize that special sharing arrangements and

coordination obligations will be a necessary aspect of the requested rulemaking in order to ensure interference free operation with the U.S. Government's use of this band for radiolocation services. Given the severe need for high quality advanced telecommunications service in non-urban and rural areas, the Petitioners request that the Commission expedite its consideration of this petition.

I. INTRODUCTION AND BACKGROUND

A. *Statement of Interest of MTI and Saddleback*

MTI is a Local Exchange Carrier ("LEC") licensed by the Arizona Corporation Commission ("ACC") to provide local exchange services within the state of Arizona.[1] MTI provides a full range of public telecommunications services from its switching center located outside Scottsdale, Arizona. As described in its application to the Arizona Corporation Commission for a Certificate of Convenience & Necessity,[2] MTI wishes to extend its services to additional residential and small business subscribers in rural Arizona. However, the lack of suitable incumbent carrier facilities for resale within these areas, and the high cost of deploying new fiber and copper access facilities, is currently preventing MTI from extending service to these communities.

MTI has examined numerous alternative technologies and solutions to this problem. In order to make the desired services available in a cost-effective manner, MTI proposes to utilize FWA technologies to the maximum extent possible when extending its serving areas. MTI believes that this technology provides the greatest potential for rapid, flexible and efficient initial deployment of robust telecommunications services. MTI also believes that in addition to the immediate benefits of rapid, cost-effective deployment, FWA technology will support long term service enhancements with significant cost

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1/ ACC Decision 60668, Feb. 9, 1998.

2/ Application T03432A970486, dated Sept. 3, 1997

reductions, all while providing communications capabilities consistent with MTI's quality, service and economic goals.[3]

The Salt River Pima-Maricopa Indian Community ("SRPMIC"), a federally recognized Indian Tribe, is located east of Scottsdale, Arizona. SRPMIC holds jurisdiction over the provision of telecommunications services within its community lands. Saddleback is a division of, and has been licensed by, SRPMIC to provide local exchange services on SRPMIC lands. In 1997, Saddleback invested in a state-of-the-art digital switching and transmission network, located on SRPMIC lands. Saddleback contracted with MTI to maintain and operate its network and sell excess network capacity throughout the state of Arizona.

Saddleback's charter is to improve the availability of advanced, full quality telecommunications services to business and residential subscribers within the SRPMIC community. This includes the provision of residential service to more than 100 community members currently without basic telephone service. The availability of these basic and advanced services will bring numerous benefits to families and community institutions, including schools, emergency services and administrative offices. MTI and Saddleback also believe that the ability to access such services will stimulate economic development within the SRPMIC community and other similarly situated communities in Arizona and elsewhere, many of which are unserved at present.

Saddleback supports MTI's efforts to seek out the latest and best available technologies that can help to achieve Saddleback's goals rapidly and economically. Saddleback is thus joining MTI in filing this petition for rulemaking. Saddleback also expects to work with MTI with respect to its proposed experimental program under the Commission's Part 5 Experimental service rules.

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[3] In support of these efforts, MTI has also applied for and received an FCC Experimental License to confirm the technical, economic and customer service aspects of this established FWA technology. Application for Experimental License, (Mar. 19, 1998) (FCC File No. 6120-EX-PL-98).

B. Fixed Wireless Access System Description

1. *System Components*

A Fixed Wireless Access system provides a means of connecting subscribers to a telecommunications network using a radio link in place of the more traditional technology of copper and fiber cable.[4] A radio transceiver installed at the subscriber premises communicates by near line-of-sight links with the base station or nodal station. Multiple base stations can be deployed in a cellular arrangement to cover a wide geographic area, if necessary.

FWA system parameters are designed to provide the optimum combination of range, services, call quality and cost for fixed, local loop applications. Features typically include:

Support of standard subscriber apparatus: telephone, answering machine, FAX, modem

Capability to support multiple subscriber lines

High base station range (approximately 20 miles) providing wide area coverage for relatively low investment

Base Station

An FWA base station consists of one or more antennas mounted at the top of a tower or mast, along with a processor unit installed inside a base station shelter or cabinet. The processor is directly connected to the Public Switched Telephone Network via conventional T1 transmission links using fiber or metallic facilities or point-to-point microwave links.

The air interface of a typical commercial FWA system is full duplex digital TDMA or CDMA, with several RF channels in two sub-bands in the 3.4 - 3.7 GHz band.

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4. On the other hand, MTI and Saddleback observe that common carriers routinely have deployed point-to-point microwave links within their infrastructure for connecting central offices in their network. FWA differs insofar as the radio link would be used to connect directly to the subscriber's home or business.

The number of subscribers served by a base station is somewhat flexible. A base station can be configured on a modular basis to provide a variable number of carriers, supporting the required number of voice and/or data channels to meet the predicted demand and required Grade of Service. Voice traffic is typically carried as 64 kbps PCM or 32 kbps ADPCM coded signals, while fax and modem traffic is carried at full 64 kbps PCM rates. Digital data connections are carried at the appropriate digital coding rates, either as circuit/channel based connections or via packet protocols, depending on the application. Current systems can support digital data rates up to Basic Rate ISDN (1B or 2B +D) or 384 kbps, and future developments are expected to support Ethernet/IP delivery up to 5 or 10 Mbps. A single base station cost effectively can support from 25 to 2,000 subscribers, depending on traffic levels and the required grade of service.

Depending on terrain, FWA systems will normally provide coverage of up to a 20 mile (30 km) radius in a rural environment. Further range increases can be achieved when terrain and propagation factors allow, *e.g.* line of sight operation, or by special engineering.

Customer Premises Equipment

The Customer Premises Equipment ("CPE") for a typical FWA system consists of a Radio Transceiver Unit ("RTU") with an integral antenna installed on the outside of the subscriber's premises, along with ancillary equipment installed inside the premises. The external equipment is both weather proof and vandal proof, and is supplied with a suitable mounting bracket.

An RTU incorporates a directional antenna, requiring near line-of-site visibility of the base station. The installation will affect the quality of the service. The RTU can be installed to provide a better Bit Error Rate than for mobile systems, and a proper installation ensures that any multipath and fading effects are shallower and slower than

those for mobiles. Commercial FWA systems have been designed to meet the Bit Error Rate objectives of ITU-T standards for end-to-end 64 kbps transmission links.

In special situations, the RTU can be mounted on a nearby structure or pole, with drop wires used to connect the lines to the subscriber premises. This might occur where there is no ac power at the subscriber location, and/or the radio path to/from the base station is obscured by structures, terrain or heavy foliage alongside the premises.

A weatherproof interface unit can facilitate interconnection between the RTU and the Residential Power Unit and telephone jacks mounted inside the customer premises. The Residential Subscriber System ("RSS") supports the connection of standard 2-wire DTMF telephones, Fax machines, data modems, answering machines and cordless telephones, and provides the customer with one or two independent analog lines, and optional ISDN BRI or Ethernet access connectors. Lines and services can be activated remotely by a software command without the need for either a site visit or additional hardware.

The functionality of the subscriber's standard telephone equipment *(e.g.*, telephone, answering machine) when attached to the FWA system is transparent from the subscriber's perspective, as if a direct wired connection was made to the PSTN. Full service capacity is provided for voice or data transmission at full speeds from Group 3 Fax machines and voice band data modems to 56 kbps. ISDN and higher speed data versions of the RSS provide the appropriate alternative interfaces and services, with or without associated analog voice line(s). Multi-line units provide additional lines to suit various business and multiple dwelling unit applications. In sum, FWA provides the carrier with the ability to provide a robust, wireline-equivalent service to its subscribers.

2. ***FWA Operational Frequencies***

The frequency allocation for a typical commercial FWA system complies with guidelines issued by CEPT/ETSI. Similar specifications and banding plans are currently

being reviewed and adopted by various spectrum management Administrations within the Americas, and in conjunction with CITEL's efforts to harmonize spectrum allocations throughout the Americas. Countries developing allocations and guidelines for FWA deployment in the Americas in the 3.4 - 3.7 GHz band currently include Mexico and Canada[5], the latter discussing border compatibility arrangements with the relevant U.S. Government agencies.

A network of base stations that can provide full geographic coverage of an area by re-using frequencies on a cellular basis requires an allocation of two frequency bands, each 15-25 MHz wide with a duplex spacing of 50 or 100 MHz . When deployed in rural locations with individual base stations geographically isolated from each other, FWA systems can be deployed using significantly less spectrum (1-5 MHz per uplink/downlink). Thus, the proposed 3.4 - 3.7 GHz band allocation will be able to support multiple service providers in an area, while still facilitating coordination with the government users.

[5] *See "Spectrum Policy and Licensing Provisions for Fixed Wireless Access Systems in Rural Areas in the Frequency Range 3400-3700 MHz"* SP3400-2700 (July 1998). Industry Canada website <http://strategis.ic.gc.ca/SSG/sf01621e.html>

II. THE COMMISSION SHOULD IMMEDIATELY ALLOCATE THE 3.4-3.7 GHZ BAND FOR FWA SERVICES

A. Existence of Public Need

The record developed herein and in previous petitions for rulemaking proceedings demonstrates the need for FWA and the suitability of the 3.4 - 3.7 GHz band for an allocation to support that technology[6]. Given the immediacy of that need, the Petitioners suggest that the Commission immediately initiate parallel rulemaking proceedings to allocate spectrum and to adopt licensing and service rules, so that this technology can be deployed as rapidly as possible.[7] In order to assist the Commission in developing proposed licensing and service rules for FWA, the Petitioners are submitting a framework for the required rule changes. Some of the specifications with regard to sharing the band with the government users must await the conclusion of the Nortel/JSC study. The Petitioners intend to supplement the record with additional detailed proposals in the near future based on their experiences under their experimental program.

There is a tremendous need for an efficient and effective wireless alternative to traditional wireline telephone services in non-urban and rural areas. The Petitioners can attest to this need based on their customers' unfulfilled telecommunications needs. SRPMIC, the territory served by Saddleback, has as many as 100 households without basic telephone service. Saddleback understands that these subscribers individually requested service from the incumbent LEC ("ILEC") and were informed that special

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[6] *See generally* Comments of Northern Telecom, *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996,* CC Docket No. 98-146, (Sept. 14, 1998).

[7] In addition, to begin to provide service using FWA technology in the territory served by MTI and Saddleback in Arizona, MTI has received experimental authority to provide these services in a few specific areas. Application for Experimental License (Mar. 19, 1998) (FCC File No. 6120-EX-PL-98).

construction charges would be applied. These special charges, of the order of several thousand dollars, are beyond the means of the majority of community members.[8] As a result, these households have gone without any telephone service for a long period of time and, unless Saddleback is able to provide service, will continue to be without service indefinitely.

The unavailability of quality telephone services has had significant adverse social and economic impacts on the community and its members.[9] In addition, isolation due to lack of access to family members, friends and other acquaintances via telephone, community members have suffered severely from the lack of rapid access to emergency services. Indeed, there have been several situations in which community members have experienced delays in dispatching ambulances to residences on SRPMIC lands.[10]

Moreover, the SRPMIC community wants to bring advanced information services into community schools and homes to further the education of its younger members and prepare them for today's information-centric economy. Although the declining costs of computers means many of these children have access to personal computers ("PCs"), the lack of suitable telephone service is preventing them from enjoying the benefits of accessing the Internet at home to conduct research and reinforce the skills obtained in the school environment. By making possible the extension of the reach of the Internet into the students' homes, FWA can complement the work of the Commission and the ACC in making advanced communications services available to schools and libraries in

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[8] *See Universal Service Methodology: Hearing before the FCC, En Banc*, (June 8, 1998) (Testimony of James M. Irvin, Chairman, Arizona Corporation Commission, at pp. 4-6).

[9] Congress reiterated the importance of universal service as a fundamental precept of communications policy in the United States when it explicitly codified universal service goals in the Communications Act of 1934 through the Telecommunications Act of 1996. *See generally*, 47 U.S.C. § 214 (e) and 47 U.S.C. § 254.

[10] In adopting new E-911 obligations, the Commission acknowledged the critical role of communications services in providing emergency services and saving lives. *See e.g., Revision of the Commission's Rules to Ensure Compatibility With Enhanced 911 Emergency Calling Systems*, 11 FCC Rcd 18676 (1996), *recon.*, 12 FCC Rcd 22665 (1997).

communities such as SRPMIC. Absent adequate telecommunications capabilities, however, SRPMIC residents will continue to be denied information services that have become commonplace in less rural communities.

In addition, small business venture development on SRPMIC community land has been hampered by the lack of suitable telecommunications infrastructure. The situation for business subscribers on the SRPMIC lands parallels that for residences -- access to even a basic analog business line can only be obtained after payment of a significant construction fee to the ILEC. This lack of communications capability at an affordable price provides a significant barrier to the launch of a new small business, whether home-based or located on commercial premises. Without adequate telecommunications, economic development within any community is a near impossibility.

These problems are not restricted to the SRPMIC lands. In the state of Arizona, the Arizona Corporation Commission has identified more than 15 geographic areas that currently are without a service provider. Within these areas, there are tens of thousands of households that cannot obtain basic telephone service.[11] The neighboring ILEC is not planning to serve these areas because they are prohibitively high cost -- expensive and difficult to serve using conventional methods -- even with Universal Service Fund ("USF") support. MTI has determined that for many of these areas, FWA is a significantly lower cost alternative to traditional fiber or copper plant for connecting to end users. FWA can also economically provide high-speed access services to schools and libraries in these unserved and underserved communities, and thereby ensure that these communities' students are connected to the National Information Infrastructure.

Moreover, MTI understands that within Arizona there are also un-served people living within existing ILEC serving areas who are only able to obtain service after payment of special construction fees, which are beyond the means of the average

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[11] *See Universal Service Methodology: Hearing before the FCC, En Banc*, (June 8, 1998) (Testimony of James M. Irvin, Chairman, Arizona Corporation Commission, at pp. 9-11)

consumer.[12] Using FWA, MTI would be able to cost effectively serve many of these subscribers and provide a competitive alternative to the incumbent, thereby fulfilling one of the objectives of the 1996 Telecom Act -- facilities based local competition in the residential and small business market.[13]

The problems described above, of course, are not peculiar to Arizona. The absence of sufficient (and affordable) communications infrastructure means there are subscribers who are unable to obtain first or second lines, ISDN or high speed data service in a timely or economic manner. This situation will worsen as the economy continues to expand, and demand for high speed Internet access to residences and public buildings continues to grow. Furthermore, many suburban and rural subscribers are unable to use their lines for Group 3 Fax or higher speed data modem services (*e.g.*, greater than 9.6 kbps) because of the existence of loading coils, faults or limitations with the existing copper plant in many areas. The deployment of xDSL and other similar higher speed access technologies in these communities is also expected to be characterized by delay, high cost and variable performance outside the higher density, higher revenue urban user communities.

In its Petition for Relief for forbearance from regulatory restrictions on the deployment of xDSL, US West indicates that it has the capability to deploy xDSL technology.[14] Within the next few months, US West expects to have available one form of this technology, rate-adaptive symmetric digital subscriber lines, or RADSL (brand name MegaBit Services), in over forty cities in all fourteen of its states.[15] Nevertheless,

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[12] *Id.* at p. 5.

[13] Under the terms of its license, MTI is entitled to operate as a competitive LEC ("CLEC") within Arizona.

[14] *Petition of US West Communications, Inc. for Relief from Barriers to Deployment of Advanced Telecommunications Services*, CC Docket No. 98-26, (Feb. 25, 1998).

[15] *Id.* at 24-25.

US West acknowledges that deployment will be frustrated in rural areas where the necessary infrastructure is not currently in place. A fixed wireless access overlay network will facilitate the capability of rural areas to access modern telecommunications services by providing access service at speeds comparable to xDSL technology.

The Communications Act of 1934, ("The Communications Act") as amended, mandated that all Americans have affordable, non-discriminating access to advanced telecommunications services. The FCC has the ultimate responsibility for ensuring that the public can benefit from timely and competitive access to the full range of modern telecommunications services, and that the service providers and infrastructures are in place to enable the achievement of this mandate.[16] The Petitioners submit that FWA can be an important tool in fulfilling this mandate.

B. *FWA Solutions at 3.4 - 3.7 GHz Offer the Best Total Solution to the Problems Discussed Above*

In examining the options for providing service to its residential and small business customers, the Petitioners considered a number of different technologies and services. Having conducted a thorough analysis, the Petitioners concluded that FWA technology in the 3.4 - 3.7 GHz band was the best available solution. Following is a summary of the analyses of the various technologies undertaken by MTI and Saddleback:

Fiber and Copper

Optical fiber and copper based services are extremely expensive to implement in the medium and lower density environments in which the Petitioners will be offering

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[16] The difficulties of carrying out this mandate are evident from the ACC's filing, dated June 2, 1998, with regard to the *FCC En Banc Hearing on Universal Service Methodology*:

> "The Arizona Corporation Commission's Proposal is unlike the other Proposals before the FCC in that it covers a very discrete issue which undermines universal service in several areas of the country including western states such as Arizona and upon which the federal funding mechanism has thus far been silent. This problem is the inability of low-income customers located in unserved and underserved areas to obtain telephone service because they cannot afford to pay the line extension or construction charges necessary to extend facilities to their homes".

service. The necessary economies of high volumes and fill rates, fast growth rates, short loops and lower maintenance costs found in higher density and urban areas are not attainable in these service areas. In addition, because of the absence of these economies, a competitive entrant, which realistically can expect to capture only 10-20% of the households or lines within a broad geographic area, could never realize the volumes and fill rates necessary to achieve competitive costs or rapid/flexible response to service demands from anywhere within the market area using fiber or copper.[17]

Essentially, fiber and copper infrastructures have a high fixed cost and low variable cost component, requiring the facilities provider to expend more than 90% of the total costs up front. Wireless infrastructures have the opposite ratio, enabling the facilities provider to better match expenditures to service demands and to modify or re-deploy the investment as demand, services and technology changes over time.

These wireline disadvantages have a very significant impact on the affordability of providing service. The Petitioners have analyzed the cost of building a new fiber and copper access infrastructure on SRPMIC lands to provide service to as many as 100 currently un-served subscribers. To serve these homes using FWA will save more than $1,000,000 of capital (plus ongoing maintenance and expense reduction), making it a viable and feasible solution.

The Rural Utilities Service explained in its comments to the Commission in the cost model proceeding that one of the most significant differences in the cost of providing basic and advanced services to rural communities, as opposed to urban areas, is in the outside plant.[18] Feeder and distribution distances are significantly greater.[19] Plant

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[17] *See e.g.*, comments of TDS Telecommunications Corporation, Inc., *In the Matter of Federal-State Joint Board on Universal Service*, CC Docket No. 96-45 and *Forward-Looking Mechanism for High Cost Support for Non-Rural LECs*, CC Docket No. 97-160, at 4 (Aug. 8, 1997).

[18] Comments of Rural Utilities Service, *Forward-Looking Mechanism for High Cost Support for Non-Rural LECs*, CC Docket No. 97-160, at 1 (September 24, 1997).

[19] *Id.*

construction not linked to roads can be cost prohibitive, and following roads requires considerably longer distances in rural territories.[20] In addition, terrain and weather conditions can affect the choice of using aerial or buried plant, and consequently increase the costs. Installation and maintenance costs can be very high where very rocky ground and ice storms are found.[21] Moreover, customer clustering in rural areas does not follow common assumptions, and structure sharing is not feasible in most circumstances.[22] These other carriers' experiences confirm the high cost of providing wireline-based services in the types of territories served by MTI and Saddleback, rendering such solutions uneconomic.

PCS, Cellular, PACS, Rural Radio and BETRS Solutions

The Petitioners also examined different potential wireless solutions. After reviewing the various alternatives, the Petitioners concluded that Personal Communications Service ("PCS"), cellular, Personal Access Communications System ("PACS"), Rural Radio and Basic Exchange Telephone Radio Systems ("BETRS") technologies do not meet requirements for capacity, range, economic feasibility, quality, reliability and feature transparency. Specifically, PCS, cellular and BETRS do not provide the fax, modem and ISDN capabilities necessary for the future higher speed data needs of target applications and subscribers. These services have been engineered for mobile and/or narrowband applications, and the technology and equipment cannot readily be reconfigured to offer the robust services demanded by the Petitioners' fixed service customers.

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[20] *Id.* at 2.

[21] *Id.* at 4; comments of Bell Atlantic, p. 1 Attachment, *Federal-State Joint Board on Universal Service, CC Docket No. 96-45*, at 1 (Oct. 17, 1997); comments of TDS Telecommunications Corporation, *Forward-Looking Mechanism for High Cost Support for Non-Rural LECS*, CC Docket No. 97-160, at 3-4 (September 24, 1997).

[22] Comments of Rural Utilities Services, p. 3-7

In addition, as a practical matter, the Petitioners do not have access to cellular spectrum in the vicinity of the SRPMIC lands. The cost of PCS spectrum being licensed via auctions, driven by the revenues associated with mobile services, is beyond that which can be supported by fixed local telephony services providing flat rate local calling.[23]

Furthermore, cellular and PCS systems incorporate their own separate proprietary switches. MTI has been unable to identify a supplier of equipment operating in the cellular or PCS bands that is compatible with its existing DMS-500 digital switch. Even if it could locate compatible equipment, the cost of a dual switch network to support residential customers is prohibitive. MTI also has found that the Base Stations and Base Station Controller infrastructures associated with cellular and PCS technologies are significantly more expensive than those associated with the proposed FWA systems. In sum, because of the service limitations and much greater costs, PCS, cellular, PACS, Rural Radio and BETRS technologies are not viable solutions to the Petitioners' needs in the low density areas in which they will operate.

Unlicensed Bands (including UPCS, PACS, DECT and PHS technologies)

Generally, the unlicensed bands are limited to low power transmitters and have relatively small bandwidths available. As a result, the geographic coverage area from a base station site is restricted to generally one to three miles at most, making them too expensive to deploy in low-density areas. By contrast, the FWA technology employed outside of high density metropolitan areas provides coverage ranges of 10-20 miles (sometimes more), which is possible because of the (relative to unlicensed services) higher powered transmitters (typically 30-40 watts EIRP). For the low power unlicensed technologies, adding more base stations or relay stations to compensate for the decreased

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[23] By way of example, the Phoenix BTA D, E and F band PCS licenses were auctioned for $11,247,000, $9,777,083 and $40,321,001, respectively.

coverage adds significantly to the overall deployment costs and backhaul complexity, which defeats the objective of using wireless technology to provide a cheaper solution than fiber and copper for the low-density areas.

In addition, the capacity required to provide wireline-equivalent and data intensive services to economic population clusters from several hundred to a few thousand subscribers within range of a base station is generally beyond the bandwidths available in the unlicensed bands. This is particularly the case if Frequency Division Duplex ("FDD") operation is used, which typically requires 50 MHz or 100 MHz FDD separation.

Moreover, even when an unlicensed band is governed by a protocol or etiquette (as with the WinForum etiquette in the UPCS band), this does not enable a carrier such as MTI to offer the predictable capacity or reliability performance expected by users at any point in time, or over any period of time. This is because there is no limit on the number of other users who might start to transmit within the band, causing interference and errors which are not acceptable as part of an engineered telecommunications service. Any techniques to frequency hop in order to avoid such interference merely reduces the overall efficiency of the band, and the capacity which can be assured for end user service. In addition, even though sufficient capacity might exist today in any particular unlicensed band or geographic area (and ignoring the restricted coverage areas of any single base station), the absence of any assured access to capacity on a reliable basis renders such services unsuitable on which to build a long term (5-20 years) investment for regulated service. In sum, in light of the higher costs and absence of reliable service, these unlicensed technologies are also unacceptable for MTI's and Saddleback's needs.

MDS/MMDS, DEMS and LMDS Services

The Petitioners also examined the broadband fixed services to determine whether they would be suitable for their needs. Unfortunately, the Multipoint Distribution Service

("MDS" including "MMDS"), Digital Electronic Message Service ("DEMS") and Local Multipoint Distribution Service ("LMDS") services are optimized for broadband delivery of entertainment and high capacity digital streams (T1 - T3) to homes and businesses, and thus are not well-suited to Petitioners' needs

The MDS/MMDS band has attractive frequency and bandwidth characteristics for residential and small business access, but there are currently no products or standards available for "wireline equivalent" telecommunications deployment. Although the MDS/MMDS industry is trying to introduce two-way services and technology into this band, the limited trials to date have been dependent on a public switched telephone network ("PSTN") or low speed/low capacity return channel. In addition, there are serious deployment difficulties arising from the 6 MHz channelization schemes used in this band, and the operation of very high powered one-way TV and ITFS transmitters adjacent to the two-way services will present difficult engineering and interference management problems. The Petitioners understand that the Commission will likely modify the service rules for this band to permit two-way services, but we have yet to find a vendor who can offer us any solution suitable for our service requirements in the foreseeable future. In addition, neither MTI nor Saddleback have economic access to these licenses for the deployment of such services. This band thus holds promise in the long run for FWA service once deployment and channelization issues are resolved, but does not present a near term solution for MTI or Saddleback. As discussed below, FWA at 3.4 - 3.7 GHz can immediately and economically fulfill those needs.

With respect to other fixed services, the DEMS and LMDS bands operate at 24 and 28 GHz respectively, which limits coverage to approximately one to three miles radius from the base station. As explained above for the low power, unlicensed services, such a limited range is insufficient for non-metropolitan deployments. In addition, for the LMDS service (with licensees obtaining over 1 GHz of spectrum), there is also far too much bandwidth available to be economic or efficient for MTI's applications. Moreover,

for both LMDS and DEMS, the installation/engineering complexity at these "pure line of sight" frequencies renders them ill-suited for MTI's and Saddleback's residential and small business target market.

Fixed Wireless Access

MTI has obtained information from a number of U.S. and foreign vendors with presently available commercial FWA solutions. The Petitioners understand that the spectrum authorities in Europe, South America and Canada have been in the process of harmonizing their FWA activities around various parts of the 3.4 - 4.2 GHz band. In addition, the U.S. Government had supported the December 1996 CITEL PCC.III Recommendation to harmonize the 3.4 - 3.7 GHz band for FWA technology in the Americas, although it was noted in that recommendation that this band may not currently be available for private sector use within the United States because of government radar allocations.[24]

Also, the NTIA and Mexican and Canadian authorities have initiated discussions concerning the various coordination issues involved in FWA allocations in the 3.4 - 3.7 GHz band. In a related vein, the Department of Defense apparently has authorized the DoD's Joint Spectrum Center to analyze the potential for interference between DoD radars and Nortel's Proximity I FWA system, with a view to potentially sharing the 3.4 - 3.7 GHz band within the United States.

Fixed Wireless Access is an appropriate and essential technology for use by certificated carriers in delivering the full range of services expected by residential and small business subscribers. The Petitioners believe that the services expected by residential and small business customers are comprised of all basic and advanced telephony and data services supported by a modern digital class 5 switching system and

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[24] Comments of Northern Telecom, *DSC Petition for Allocation of Radio Spectrum in 2 GHz Band for Wireless Fixed Access Local Loop Services*, Attachment C, RM 8837, (Aug. 12, 1996).

transmission network. This includes payphones, equal access, access to operator and 911 emergency services, leased lines, "full speed" Fax, modem and digital data services, basic and primary rate ISDN and high speed Internet access.[25] Rural subscribers should have access to the same set of services enjoyed by residential and small business subscribers in higher density metropolitan areas. Even where the technology used to access subscribers is wireless, true equivalence to delivery by wireline technologies and end user service transparency should not (and need not) be sacrificed.[26]

MTI does not believe that the Commission's revised universal service program will provide an instant or complete fix to the problem of degraded service in less densely populated areas. Universal service support has not been crafted to ensure access to this wide range of services. The Commission has defined the minimum capability for universal service support as voice-grade access with a minimum bandwidth as defined by ANSI of from 300 to 3000 Hz. The less stringent ANSI definition was specifically chosen to ensure that most carriers would be able to qualify for universal service support. Notwithstanding the needs and expectations of subscribers in low-density areas such as those served by MTI, high-speed data transmission necessary for Internet access, is not currently a goal of universal service.[27]

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[25] Although broader than the services covered by universal service support, MTI and Saddleback believe that this wider range of capabilities is consistent with residential and small business expectations.

[26] *See generally* Northern Telecom Comments, *DSC Petition for Allocation of Radio Spectrum in 2 GHz Band for Wireless Fixed Access Local Loop Services*, RM Docket No. 8837, filed August 12, 1996.

[27] As the Commission explained in its universal service order:

> "To the extent customers find that voice grade access to the public switched network is inadequate to provide a sufficient telecommunications link to an Internet service provider, we conclude that such higher quality access links should not yet be included among the services designated for support pursuant to section 254(c)(1). We find that a network transmission component of Internet access beyond voice grade access should not be supported separately from voice grade access to the public switched network because the record does not indicate that a substantial majority of residential customers currently subscribe to Internet access by using access links that provide higher quality than voice grade access. *Federal-State Joint Board on Universal Service, Report & Order* at para. 83, FCC 97-157, CC Docket 96-45 (1997).